## BI2 - January 2003

1. **D** = Stomata / stoma;

Exchange of gases (allow: CO2 in; not: allow water to escape) (2)

**B** = Palisade (mesophyll) layer;

(Main) site of photosynthesis/synthesis of sugars (2)

**C** = Air spaces; (not: spaces)

(Rapid) diffusion of gases (not: exchange of gases) (2)

**A** = (Waxy) cuticle;

Reduces water loss (not: protection)

(allow: prevents water loss) (2)

***2 marks for each one for name, one for qual.***

**Total 8 marks**

2. (a) **A** Tricuspid valve / atrio ventricular valve (1)

**B** Vena cava (1)

**C** (Dorsal) Aorta/aortic arch (1)

**D** Left Ventricle (1)

(b) 1 mark for position (between papillary muscle and line at edge of

heart.) (1)

1 mark for closed (If 1 only drawn, only this mark available) (1)

(c) Prevents valve inverting (not: support) (1)

(d) (i) Pacemaker in wall of right atrium/contraction initiated

in right atrium. (1)

(ii) To transmit wave of depolarisation to (apex of) ventricles

owtte. (1)

(iii) Wave of contraction starts at base of ventricles and moves

upwards (not: muscle stronger) (1)

(e) (i) Reduce dilation during systole;

Cope with high pressure.

Restrict diameter therefore increase blood pressure;

Vaso constriction/vaso dilation

Elastic recoil increases blood pressure/keeps blood flowing.

***Any two*** (2)

(ii) So that it does not interfere with flow of blood/reduce

friction/blood flows more easily (1)

**Total 13 marks**

3. (a) **A** Light/solar energy/(sun)light (not: sun, allow: photosynthesis) (1)

**B** (Energy loss) Respiration (1)

**C** (Energy loss) Excretion/Egestion/production of faeces/urine/

waste (not: faeces/urine/wastage) (1)

(b) Third (1)

(c) (i) Spider (1)

(ii) Higher/maintaining body temp / Higher metabolic rate

(not: ref. to size) (1)

(iii) Less cellulose/fibre in diet/undigestible matter. (1)

(d) (i) (Could be) greater productivity in oceans / higher energy conversion

less support required in oceans, less cellulose etc./less egestion/

oceans mainly ectothermic animals, respiratory loss greater/

less muscular activity, support etc. in oceans, respiratory

rate lower.

***Any one***  (1)

(ii) Any one of above but different. (1)

(iii) Less cellulose/lignin/undigestible material in grasses; (or converse)

Productivity could be lower in forest? (1)

(iv) Energy lost at each transfer, not enough energy in last trophic

level to support another layer. (allow: energy runs out) (1)

**Total 11 marks**

4. (a) (i) 95% saturation (1)

(ii) 44/45% saturation in muscle (1)

(iii) 571/560 × 106 (1)

(b) (i) To left of normal (1)

(ii) Does not become saturated at the pp of oxygen in environment/

At low pp oxygen does not release as much oxygen

(allow: does not have a strong enough affinity) (1)

(iii) In tissues with high pp. O2 no release of O2;

Small drop in pp O2 at lower pp O2 too much released/all or

nothing;

Less oxygen released at lower pp of oxygen (max 1) (1)

(c) (i) To right of normal;

Bohr effect. (2)

(ii) (High CO2 levels) (high respiration) causes more oxygen release;

at the same pp. of oxygen. (2)

(d) Higher affinity for oxygen;

Allow fetus to absorb oxygen from mother. (2)

**Total 12 marks**

5. (a) Surface area not increasing at same rate as volume, volume of cytoplasm

related to rate of use of oxygen and nutrients, surface area related to rate

of uptake by diffusion/SA: vol ratio not enough

maximum rate of diffusion of materials through cytoplasm/distance;

Accept reference to nucleus.

not able to exchange enough as it gets bigger.

(Allow: support qualified)

***Any two***  (2)

(b) Large surface area;

moist skin/surface

blood supply close to surface;

rich/well developed capillary network in skin/good blood supply at

surface/skin

haemoglobin.

***Any three***  (3)

(c) (i) Blood and water;

Flow in opposite directions. (2)

(ii) More efficient exchange of gases/constant diffusion/exchange across

whole lamella.

Concentration gradient maintained. (2)

**Total 9 marks**

6. (a) (i) Keep surface of cells moist/lubricated;

Medium through which materials can diffuse;

Supply nutrients / named nutrients to cells; e.g. O2

Take away waste products / named; e.g. CO2

Take away products of cells / named;

Ref. protection/support.

***Any two*** (2)

(ii) Return excess (tissue) fluid;

to blood system/subclavian vein

Ref. lymphocytes/defence against disease (not: wbc unqualified)

Ref. absorption of fats/lacteals

***Any two*** (2)

(b) Proteins (albumin) main osmotic material in blood;

Less protein easier for fluid to be lost from capillaries (balance between

osmotic and hydrostatic pressure changed);

Less water in tissue fluid reabsorbed;

Oedema is swelling caused by accumulation of tissue fluid.

***Any three*** (3)

7. (a) Forestry/Fishing

**A** Habitat destruction / comment on destruction balanced ecosystems

**B** Reduction in biodiversity/owtte

**C** Qual of above e.g. loss of potentially important therapeutic plants /

reduction gene pool

**D** Soil erosion / dust bowls

**E** Increase in sedimentation/deposits

**F** Climate change/example/ref. to global warming

**G** Fall in CO2 reduction/raising CO2 levels/O2

**H** Reduction of population to below sustainable levels/numbers cannot be maintained - will be further decline

**I** Curtailment of breeding due to fewer mature fish

**J** Replanting

**K** Regeneration

**L** Quotas

**M** Managed areas / farms to supply commercial timber/fish/plant renewable resources

**N** Reduction fleet size/number of days fishing

**O** Exclusion zones/protected areas

**P** Restricted mesh size

**[Ten marks to be awarded from the fifteen available]** (10)

**Total 10 marks**

(b) **A** Root hair increases surface area/large surface area

**B** Water absorbed by osmosis

**C** Correct reference and use of term water potential/high to low/down gradient

**D** Vacuolar pathway

**E** Symplastic pathway diffusion/qualified e.g. cytoplasm

**F** Correct reference plasmodesmata

**G** Correct reference apoplastic movement/cell walls (by capillary action)

**H** Reference endodermis/pumping (mineral) ions into xylem

**I** Reference casparian strip qualified (position/what it is)

**J** Prevents apoplastic movement/drives water/(and) mineral ions

into symplast

**L** Water sucked from above as a result of transpiration stream

**M** Sucked into xylem vessels as result of low pressure

**N** Water into xylem because of low psi/down wp gradient

**O** Mineral ions absorbed by active transport/diffusion into root

**P** Diffusion through plasmodesmata (down concentration gradient)

**[Ten marks to be awarded from the fifteen available]** (10)

**Total 10 marks**